

grating structure into the substrate or into the cover medium or into the substrate and into the cover medium;

5 means for the generation of a referenced sensor signal through the evaluation of the detected light distribution, of the detected positions or of intensities of the at least two light distribution proportions or of a combination of these.

23. The optical sensor according to claim 1, wherein said light source means comprises a laser diode or a light-emitting diode.

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35. A sensor chip for the characterization or the detection or for the detection and characterization of at least one chemical or bio-chemical substance, comprising at least one optical waveguide with a substrate, waveguiding material, and at least one waveguide grating structure, the substrate comprising a bottom,

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and said waveguide grating structure being configured such as to form at least two sensing pads, each comprising a chemosensitive or biochemosensitive substance,

said waveguiding material not being plane-parallel to the bottom of the substrate.

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39. The sensor chip according to claim 35, wherein the waveguiding material is a waveguiding film comprising at least one layer.

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40. The sensor chip according to claim 39, wherein the waveguiding film comprises at least one layer of high refractive index or at least one polymer layer or at least one layer of a high refractive index and one polymer layer.

44. A sensor chip for the characterization or detection or for the detection and characterization of at least one chemical or bio-chemical substance, comprising at least one optical waveguide with a

substrate comprising a bottom, waveguiding material, and at least one waveguide grating structure,

and said waveguide grating structure forming at least two sensing pads, each comprising a chemosensitive or biochemosensitive substance,

each sensing pad comprising at least one in-coupling grating and at least one out-coupling grating,

the in-coupling gratings of the two sensing pads being arranged next to each other.

48. The sensor chip according to claim 44, wherein the waveguiding material is a waveguiding film comprising at least one layer.

49. The sensor chip according to claim 48, wherein the waveguiding film comprises at least one layer of high refractive index or at least one polymer layer or at least one layer of a high refractive index and one polymer layer.

54. A sensor chip for the characterization or detection or the detection and characterization of at least one chemical or bio-chemical substance, comprising at least one optical waveguide with a substrate, waveguiding material, and at least one waveguide grating structure, the substrate comprising a bottom, waveguiding material, and at least one waveguide grating structure,

and said waveguide grating structure being configured so as to form at least two sensing pads, each comprising a chemosensitive or biochemosensitive substance,

each sensing pad comprising one unidiffractive or multidiffractive grating for use in a reflection type zero diffraction order or higher diffraction order arrangement or in a transmission type zero diffraction order or higher diffraction order arrangement or in a reflection and transmission type

zero diffraction order or higher diffraction order arrangement.

58. The sensor chip according to claim 54, wherein the waveguiding material is a waveguiding film comprising at least one layer.

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59. The sensor chip according to claim 58, wherein the waveguiding film comprises at least one layer of high refractive index or at least one polymer layer or at least one layer of a high refractive index and one polymer layer.

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63. An optical process for the characterization or for the detection or the detection and characterization of at least one chemical or bio-chemical substance in a specimen by means of a waveguide grating structure containing at least one waveguide grating structure unit, wherein the specimen is brought into contact with the waveguide structure in at least one contact zone comprising a sensor chemosensitive or bio-chemosensitive substance and a reference chemosensitive or bio-chemosensitive substance.

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in the waveguide structure in the region of the at least one contact zone, exciting at least two light waves through the waveguide grating structure unit or at least one grating of the sensor pad and one grating of the reference pad of the waveguide grating structure unit are illuminated, and bringing at least one light wave into interaction with the specimen,

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wherein the light waves differ in at least one of their polarization, their mode number, their wavelength and of their position on the waveguide grating structure, or the sensor chemosensitive or bio-chemosensitive substance and the reference chemosensitive or bio-chemosensitive substance are different, or where at least one light wave is brought into interaction with a first specimen and a second light wave is brought into interaction with a second specimen;

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detecting light in at least two differing proportions, which are not superimposed on the detection

means and of which at least one proportion originates from the at least one contact zone,

generating at least one referenced measured signal by the evaluation of the detected light.

5 Add the following new claims:

71. A sensor chip for the characterization or detection or for the detection and characterization of at least one chemical or bio-chemical substance, comprising at least one optical waveguide with a substrate comprising a bottom, a waveguiding material, and at least one waveguide grating
10 structure, and said waveguide grating structure forming at least two sensing pads, each comprising a chemosensitive or biochemosensitive substance, the sensor chip comprising a capillary flow cell or an array of capillary flow cells or a capillary vessel or an array of capillary vessels.

15 72. The sensor chip according to claim 71, wherein the substrate is made of a plastic material or is made of glass.

73. The sensor chip according to claim 71, wherein the waveguiding material is a waveguiding film comprising at least one layer.

20 74. The sensor chip according to claim 73, wherein the waveguiding film comprises at least one layer of high refractive index or at least one polymer layer or at least one layer of high refractive index and one polymer layer.

25 75. The sensor chip according to claim 71, wherein the substrate is provided with an intermediate layer of low refractive index.

REMARKS